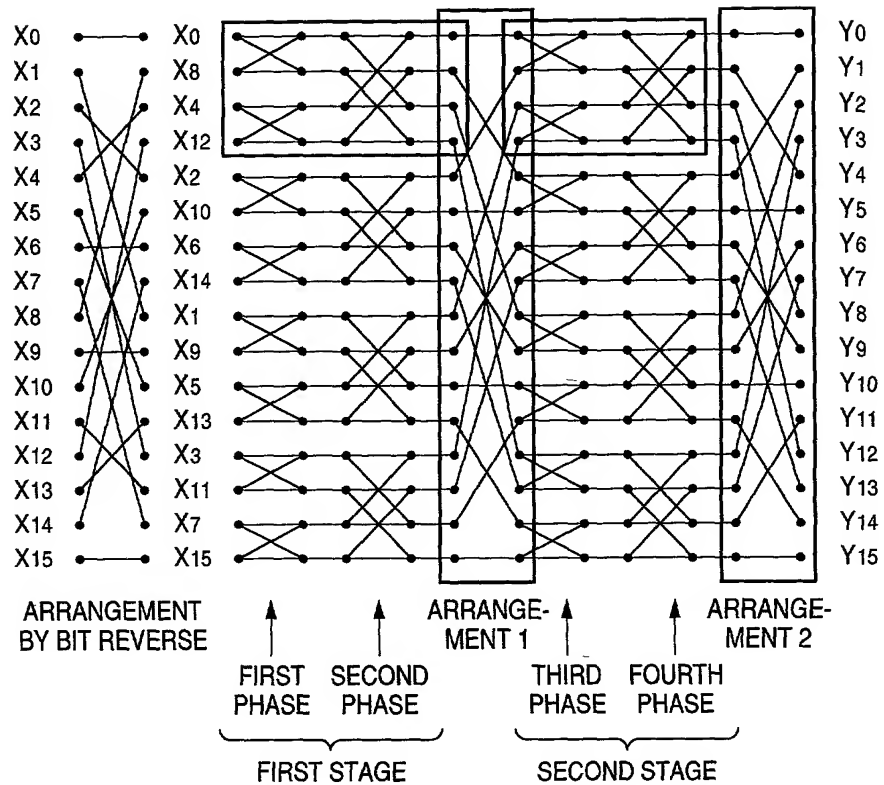


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FIG. 1



TIME DECIMATION METHOD

$$\begin{aligned} X_1 & \xrightarrow{\quad} y_1 = x_1 + W^r \cdot x_2 \\ X_2 & \xrightarrow{\quad} y_2 = x_1 - W^r \cdot x_2 \end{aligned}$$

The diagram shows a butterfly operation for the time decimation method. Input X_1 goes to the top output y_1 and input X_2 goes to the bottom output y_2 . A rotator W is applied to x_2 before it is added to x_1 to produce y_1 . A multiplier -1 is applied to x_2 before it is subtracted from x_1 to produce y_2 .

FREQUENCY DECIMATION METHOD

$$\begin{aligned} X_1 & \xrightarrow{\quad} y_1 = x_1 + x_2 \\ X_2 & \xrightarrow{\quad} y_2 = (x_1 - x_2) \cdot W^r \end{aligned}$$

The diagram shows a butterfly operation for the frequency decimation method. Input X_1 goes to the top output y_1 and input X_2 goes to the bottom output y_2 . The inputs are added to produce y_1 . The inputs are subtracted to produce y_2 , and then a rotator W is applied to y_2 .

x_1, x_2 : INPUT DATA (COMPLEX NUMBER)
 y_1, y_2 : OUTPUT DATA (COMPLEX NUMBER)
 W_r : ROTATOR COEFFICIENT (COMPLEX NUMBER)
 $W = \text{EXP}(-j2\pi r/N)$ N : SAMPLE NUMBER

FFT COMPUTATION EXPRESSION 1

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FIG. 2-1

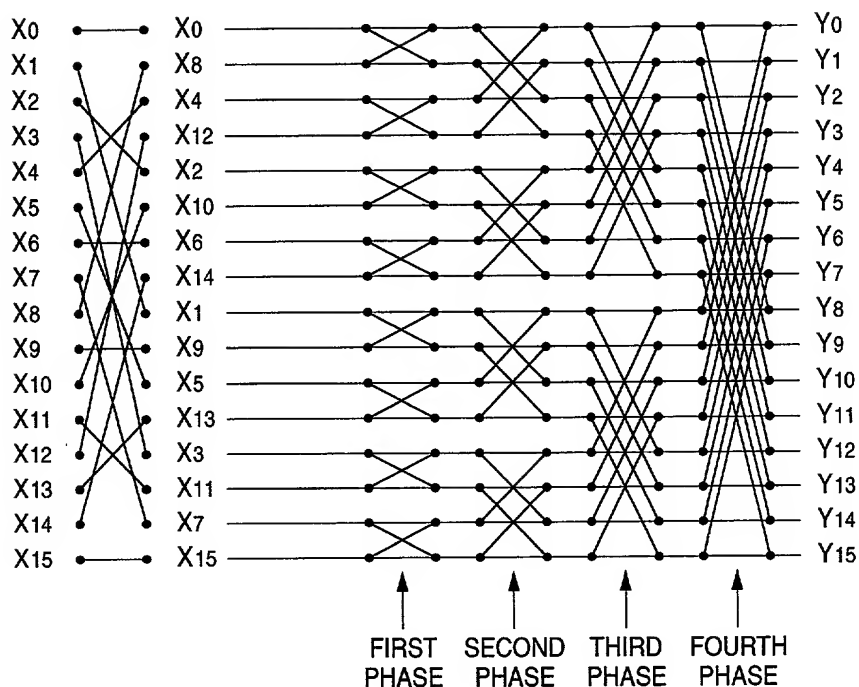
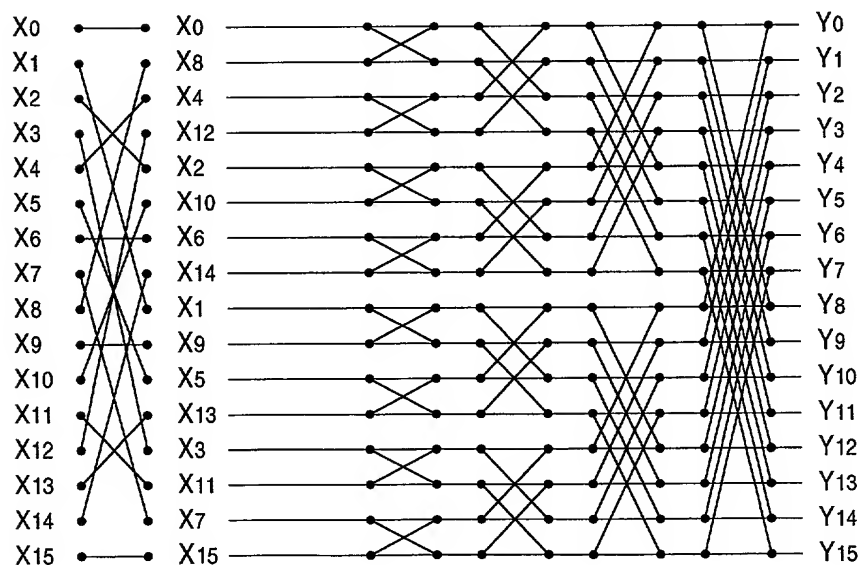


FIG. 2-2



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FIG. 3

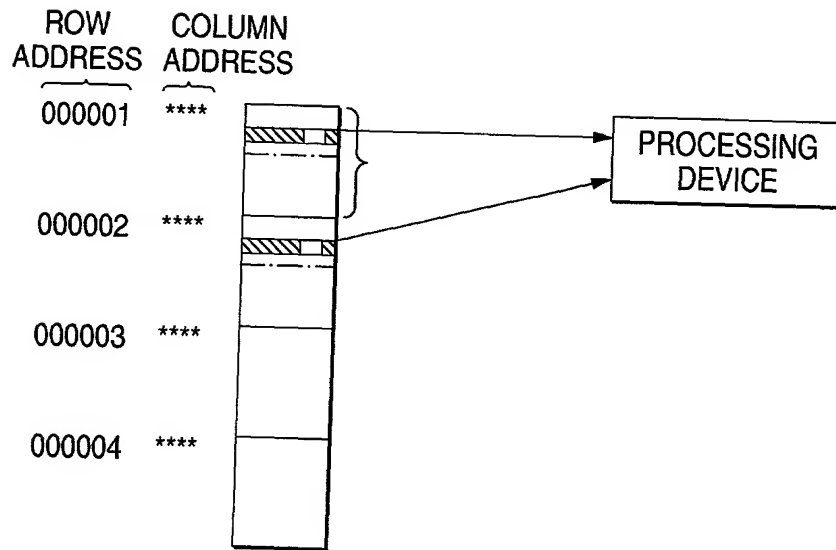
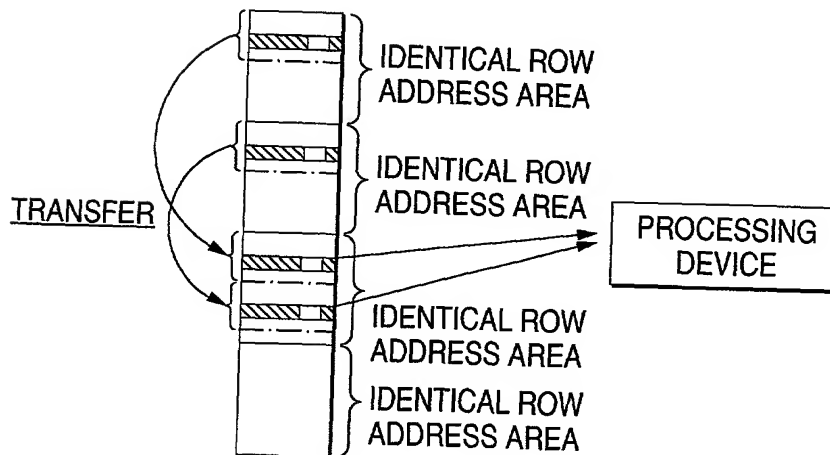


FIG. 4



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FIG. 5-1

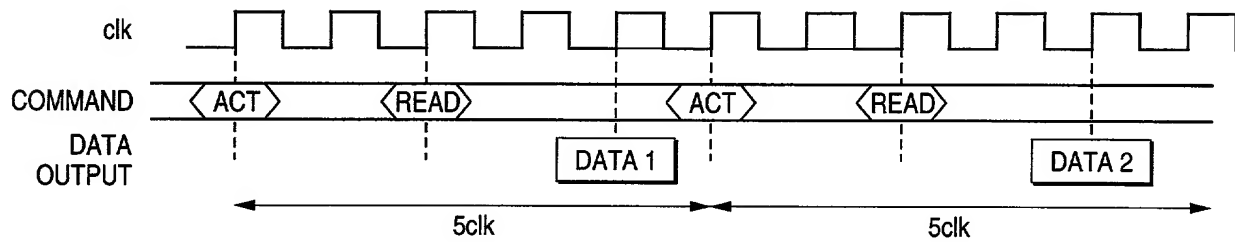


FIG. 5-2

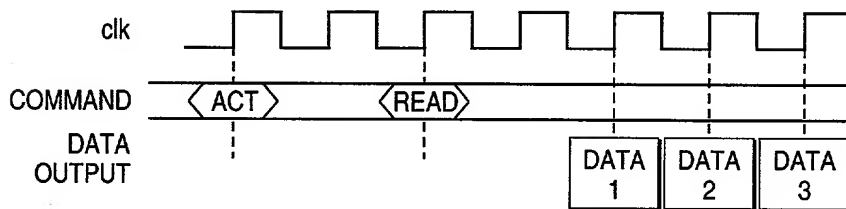


FIG. 5-3

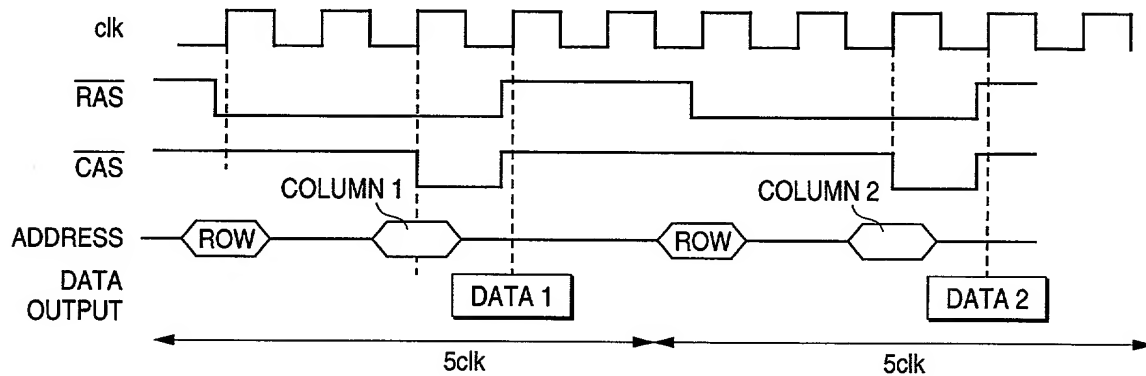
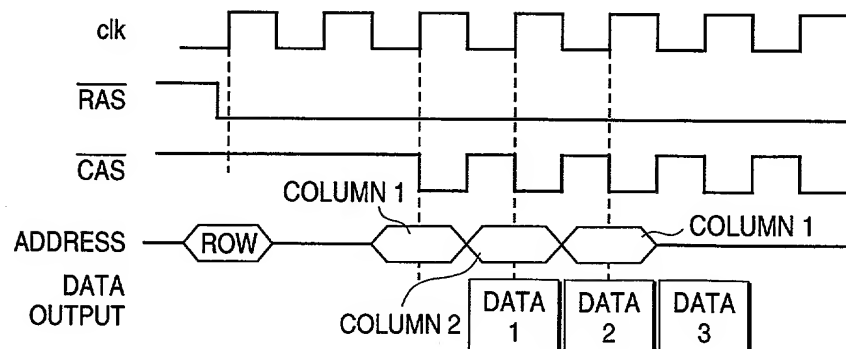


FIG. 5-4



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FIG. 6-1

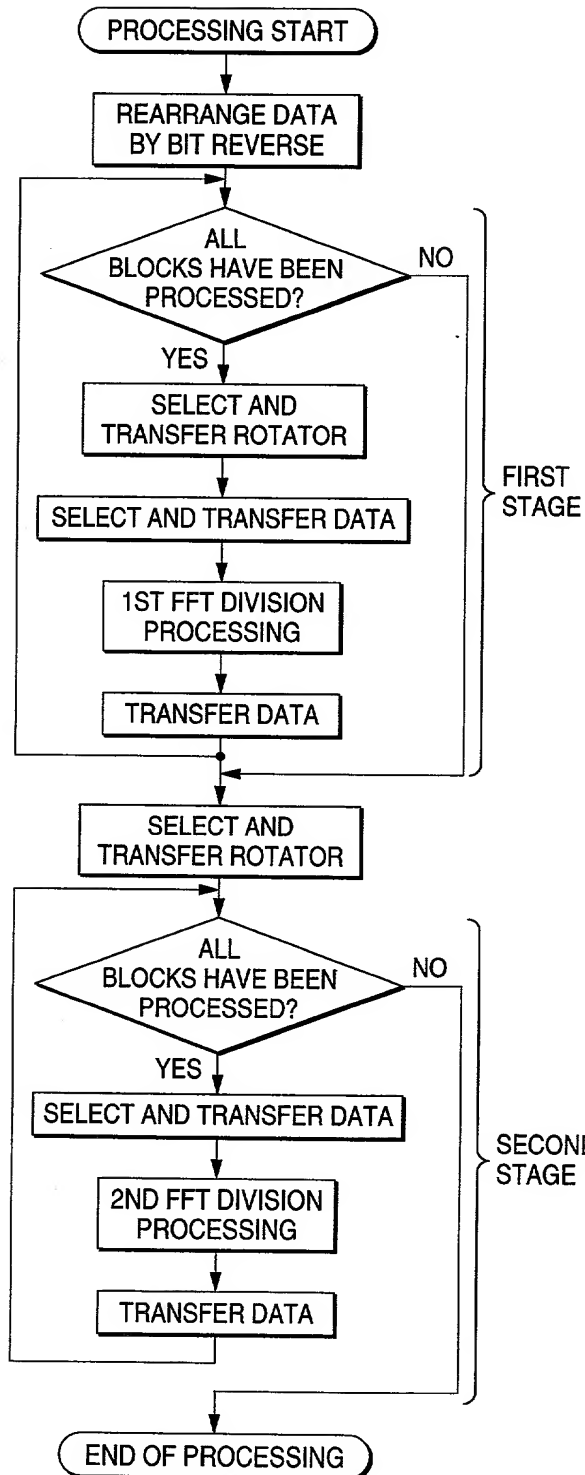
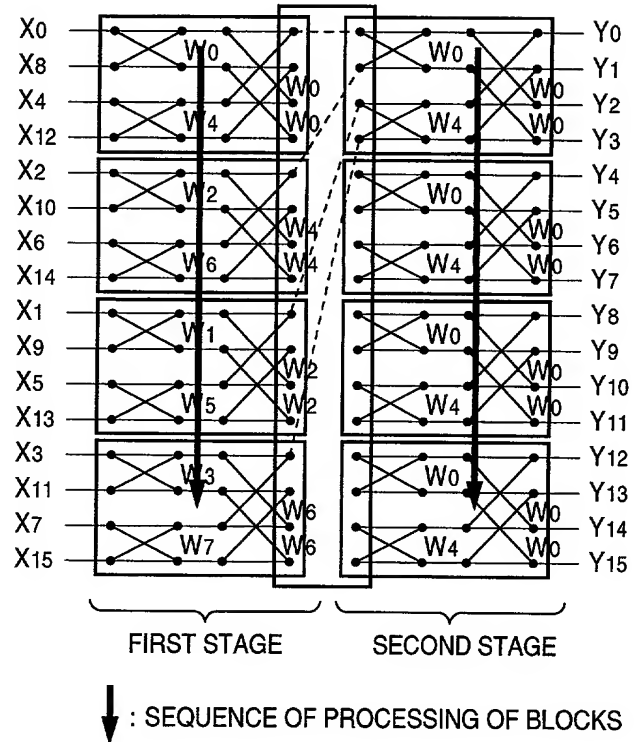


FIG. 6-2



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FIG. 7

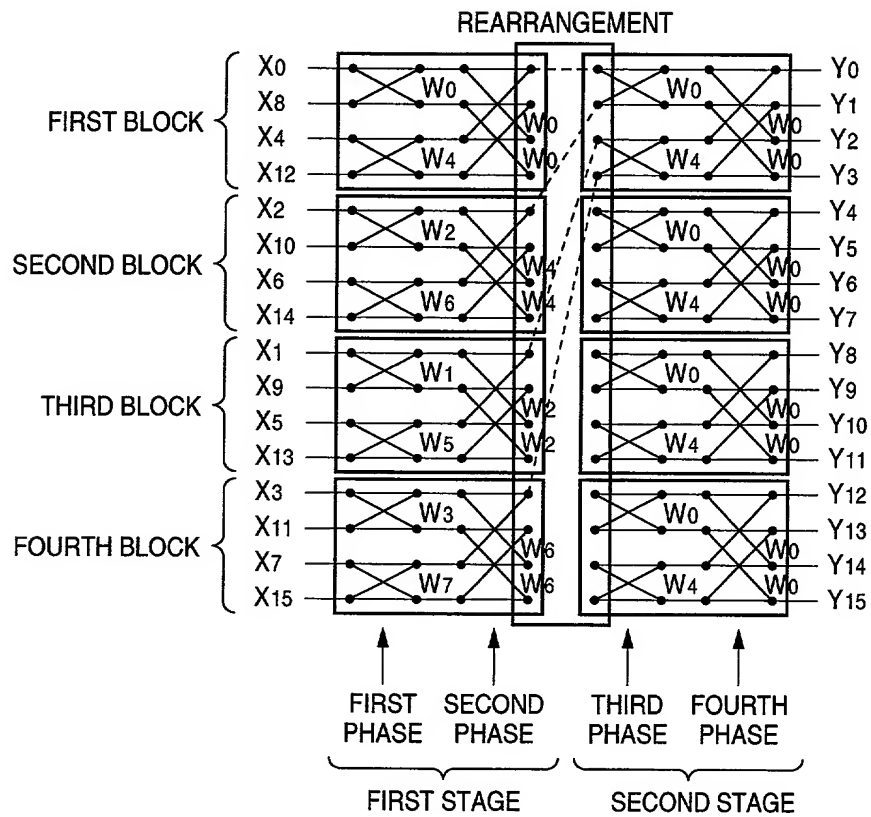
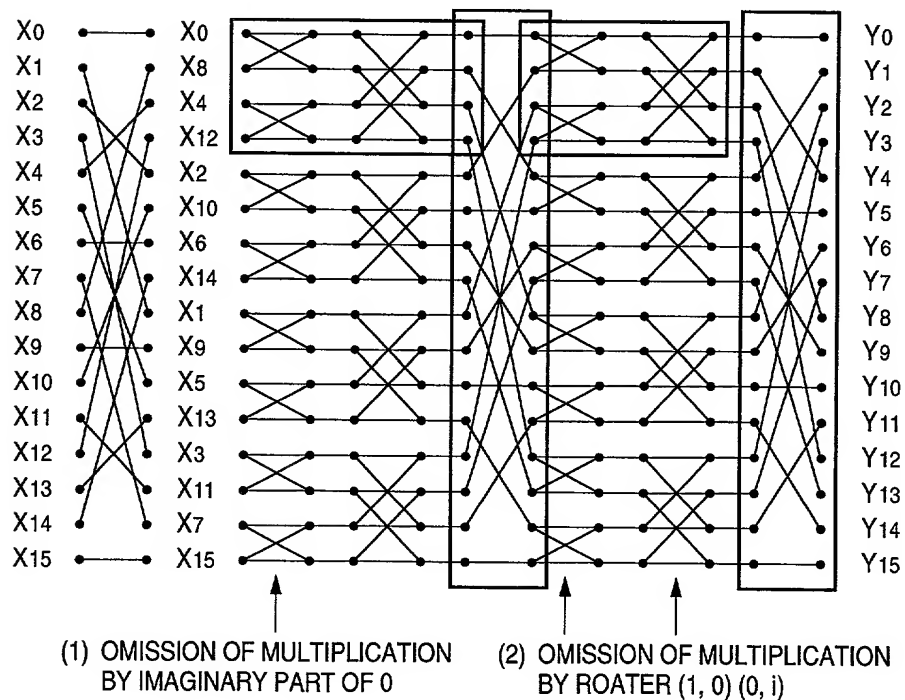


FIG. 8



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FIG. 9

FIRST BLOCK				SECOND BLOCK			
FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE	FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE
w[0]	w[0]	w[0]	w[0]	w[0]	w[0]	w[0]	w[0]
w[4]	w[4]	w[4]	w[4]	w[4]	w[4]	w[4]	w[4]
w[2]	w[2]	w[2]	w[2]	w[2]	w[2]	w[2]	w[2]
w[6]	w[6]	w[6]	w[6]	w[6]	w[6]	w[6]	w[6]
w[1]	w[1]	w[1]	w[1]	w[1]	w[1]	w[1]	w[1]
w[5]	w[5]	w[5]	w[5]	w[5]	w[5]	w[5]	w[5]
w[3]	w[3]	w[3]	w[3]	w[3]	w[3]	w[3]	w[3]
w[7]	w[7]	w[7]	w[7]	w[7]	w[7]	w[7]	w[7]
THIRD BLOCK				FOURTH BLOCK			
FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE	FIRST STAGE	SECOND STAGE	THIRD STAGE	FOURTH STAGE
w[0]	w[0]	w[0]	w[0]	w[0]	w[0]	w[0]	w[0]
w[4]	w[4]	w[4]	w[4]	w[4]	w[4]	w[4]	w[4]
w[2]	w[2]	w[2]	w[2]	w[2]	w[2]	w[2]	w[2]
w[6]	w[6]	w[6]	w[6]	w[6]	w[6]	w[6]	w[6]
w[1]	w[1]	w[1]	w[1]	w[1]	w[1]	w[1]	w[1]
w[5]	w[5]	w[5]	w[5]	w[5]	w[5]	w[5]	w[5]
w[3]	w[3]	w[3]	w[3]	w[3]	w[3]	w[3]	w[3]
w[7]	w[7]	w[7]	w[7]	w[7]	w[7]	w[7]	w[7]

	FIRST BLOCK	SECOND BLOCK	THIRD BLOCK	FOURTH BLOCK
0	w[0]	w[2]	w[1]	w[3]
1	w[4]	w[6]	w[5]	w[7]
2	w[0]	w[4]	w[2]	w[6]

FIG. 10

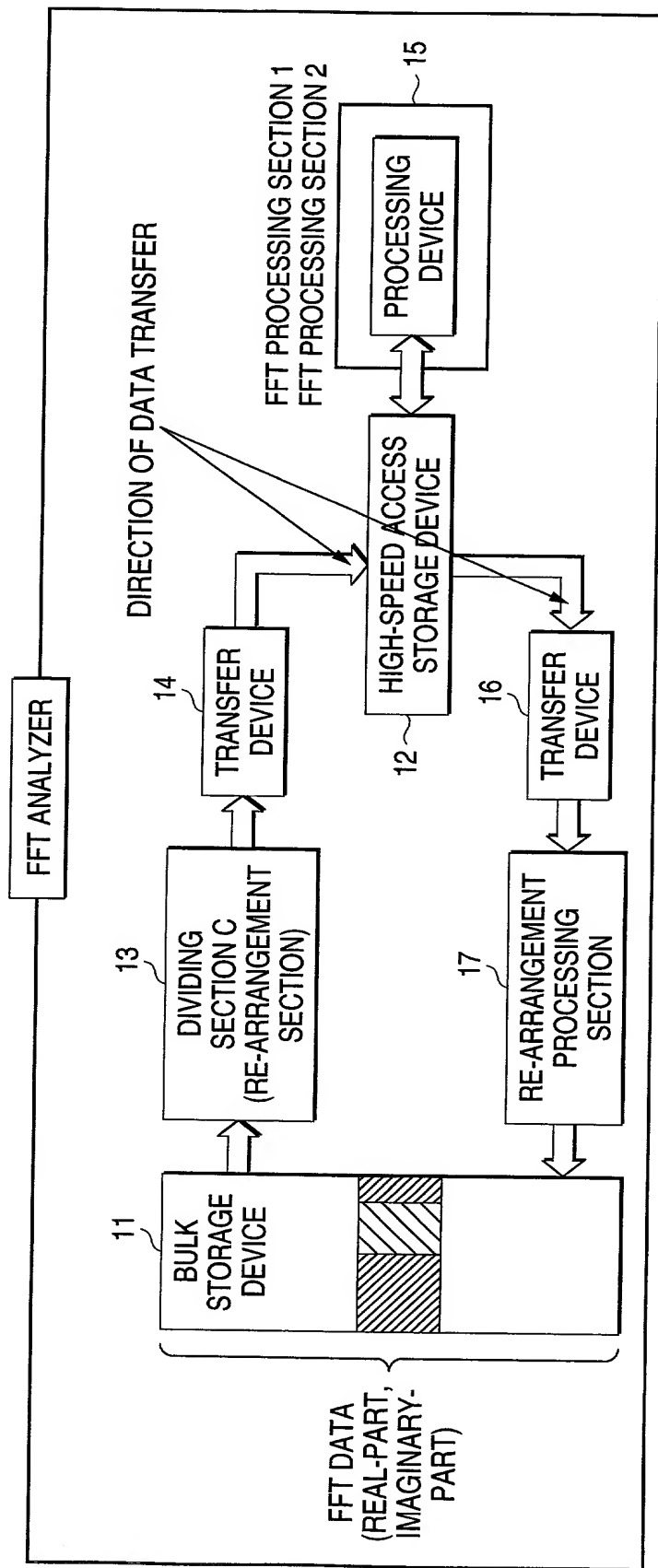


FIG. 11

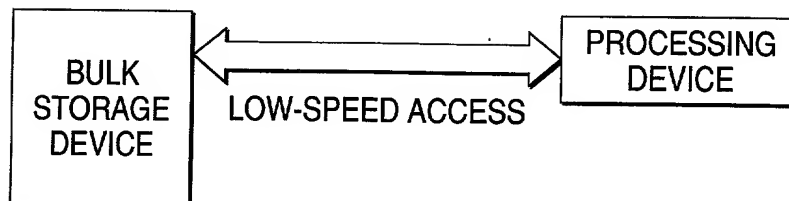


FIG. 12-1

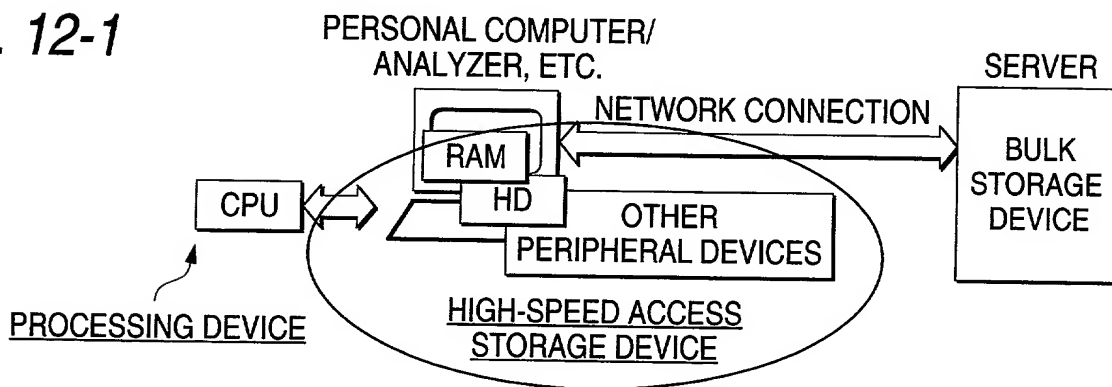


FIG. 12-2

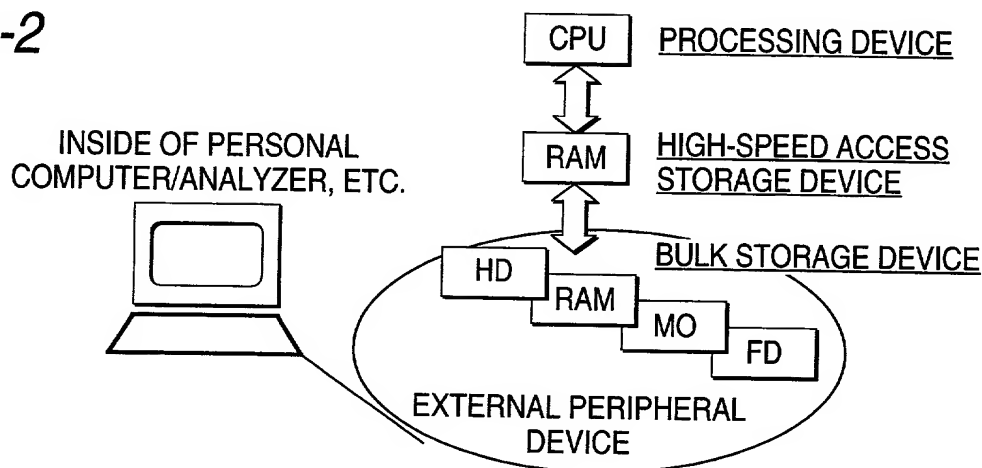


FIG. 12-3

